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| <p>Applicants: Nilesh Shah, et al.</p> <p>Application No.: 10/077,696</p> <p>Filed: 02/13/2002</p> <p>Title: SILICON-BASED STORAGE VIRTUALIZATION</p> <p>Attorney Docket No.: 00121-001600000 (Previously Attorney Docket 5693.P213)</p> | <p>Group Art Unit: 2157</p> <p>Conf. Num: 1454</p> <p>Examiner: Burgess, Barbara N.</p> |
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Amendments to the claims:

This listing of the claims will replace all prior versions, and listings, of claims in the application:

Listing of the claims:

1. (Currently amended) A storage server in a storage area network connecting a plurality of host computers and a plurality of storage devices, said storage server comprising:

a switching circuit in the storage server that connects a plurality of storage processors and associates a first storage processor from the plurality of storage processors associated with said plurality of host computers and further associates a second storage processor from the plurality of storage processors with said plurality of storage devices, wherein said plurality of storage processors in the storage server receive a plurality of command packets and a plurality of data packets; and

a switching circuit connecting said plurality of storage processors; and

a microengine in each of the plurality of storage processors to process said plurality of command packets and plurality of data packets using microcode and, wherein said first microengine is configured to execute a first process comprising: configuring configure a routing path through said switching circuit to establish communication between [[a]] the first storage processor and [[a]] the second storage processor of said plurality of storage processors, via said switching circuit, wherein the microcode executing on the microengines from one or more of the plurality of storage processors is responsive to at least one, in

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~~aeeordance with~~ a command packet of said plurality of command packets[[;]] and embeds routing instructions for the routing path directly in each [[a]] data packet of said plurality of data packets over said path[[,] using one or more microcode instructions in the microcode thereby allowing initial routing operations for a data packet prior to completely receiving said data packet, between said first storage processor and said second storage processor [[via]] through said switching circuit to take place prior to completely receiving said data packet in the entirety.

2. (Original) The storage server of claim 1, wherein said first storage processor includes a lookup table that associates one or more virtual logical unit numbers (VLUNs) with one or more physical logical unit numbers (PLUNs), wherein said one or more PLUNs are associated with said plurality of storage devices, and wherein said one or more VLUNs are virtualizations of said one or more PLUNs.

3. (Currently amended) The storage server of claim 1, wherein [[said]] a first microengine is a component of the first storage processor and executes microcode on behalf of said first storage processor when configuring the routing path between the first storage processor and the second storage processor.

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4. (Original) The storage server of claim 1, further comprising:

a plurality of microengines, wherein said plurality of microengines are components of said plurality of storage processors.

5. (Original) The storage server of claim 1, wherein said plurality of data packets are received from one of said plurality of host computers.

6. (Original) The storage server of claim 1, wherein said plurality of data packets are received from one of said plurality of storage devices.

7. (Original) The storage server of claim 1, wherein said plurality of data packets are received from more than one of said plurality of storage devices.

8. (Original) The storage server of claim 1, wherein said plurality of data packets are routed to one of said plurality of host computers.

9. (Original) The storage server of claim 1, wherein said plurality of data packets are routed to one of said plurality of storage devices.

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10. (Original) The storage server of claim 1, wherein said plurality of data packets are routed to more than one of said plurality of storage devices.

11. (Currently amended) The storage server of claim 1, wherein further comprising a second microengine is a component of the second storage processor and executes microcode on behalf of said second storage processor when configured to execute a second process comprising: configuring a plurality of paths between the second storage processor and a storage device of the plurality of storage devices in accordance with said command packet.

12. (Original) The storage server of claim 1, wherein said first storage processor receives said command packet from one of said plurality of host computers.

13. (Original) The storage server of claim 1, wherein said first storage processor receives said command packet from one of said plurality of storage processors.

14. (Currently amended) The storage server of claim 1, wherein said first microengine uses a command handle in said command packet to perform a tree search to configure said path.

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15. (Original) The storage server of claim 1, wherein said first storage processor passes a handle to said second storage processor.

16. (Original) The storage server of claim 1, wherein said first storage processor and said second storage processor are a single storage processor.

17. (Previously presented) The storage server of claim 1, wherein said first microengine routes said data packet according to a routing tag therein.

18. (Original) The storage server of claim 1, further comprising:

 a virtual server controller configured to program, via a configuration command, a lookup table in one of said plurality of storage processors, wherein said lookup table associates one or more virtual logical unit numbers (VLUNs) with one or more physical logical unit numbers (PLUNs).

19. (Currently amended) A method of routing data in a storage area network ~~connecting~~ having a storage server between a plurality of host computers and a plurality of storage devices, comprising:
~~said storage server having a plurality of storage processors and a switching circuit, said plurality of storage processors receiving a plurality of command packets and a plurality of data packets, said method comprising:~~

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associating a first storage processor from a plurality of storage processors with said plurality of host computers and a second storage processor from the plurality of storage processors with said plurality of storage devices wherein said plurality of storage processors are in the storage server;
receiving a plurality of command packets and a plurality of data packets to be processed on the plurality of storage processors;

configuring a routing path between a first storage processor and a second storage processor of said plurality of storage processors, ~~via said switching circuit, in accordance with in response to receipt of~~ a command packet of said plurality of command packets; and

embedding routing instructions from the routing path directly in each [[a]] data packet of said plurality of data packets to be transmitted over said routing path[[,]] thereby allowing initial routing operations for a data packet prior to completely receiving said data packet, between said first storage processor and said second storage processor ~~via said switching circuit to take place prior to completely receiving said data packet in the entirety.~~

20. (Currently amended) The method of claim 19, wherein the routing operations for said data packet over said path further comprises routing said data packet to one of said plurality of host computers.

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21. (Currently amended) The method of claim 19, wherein the routing operations for said data packet over said path further comprises routing said data packet to one of said plurality of storage devices.

22. (Currently amended) The method of claim 19, wherein the routing operations for said data packet over said path further comprises routing said data packet to more than one of said plurality of storage devices.

23. (Previously Presented) The method of claim 19, further comprising configuring a plurality of paths between the second storage processor and a storage device of the plurality of storage devices in accordance with said command packet.

24. (Currently amended) A method of routing data in a storage area network ~~connecting~~ having a storage server between a plurality of host computers and a plurality of storage devices, comprising: ~~said storage server having a plurality of storage processors and a switching circuit, said plurality of storage processors receiving a plurality of command packets and a plurality of data packets, said method comprising:~~

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associating a first storage processor from a plurality of storage processors with said plurality of host computers and a second storage processor from the plurality of storage processors with said plurality of storage devices wherein said plurality of storage processors are in the storage server;
receiving a plurality of command packets and a plurality of data packets to be processed on the plurality of storage processors;

configuring a routing path between a first storage processor and a second storage processor of said plurality of storage processors, ~~via said switching circuit, in accordance with in response to receipt of~~ a command packet of said plurality of command packets;

embedding routing instructions from the routing path directly in each [[a]] data packet of said plurality of data packets over said path[[,]] ~~thereby allowing initial routing operations for a data packet prior to completely receiving said data packet, between said first storage processor and said second storage processor to take place prior to completely receiving said data packet in the entirety via said switching circuit;~~ and

configuring a plurality of paths between the second storage processor and a storage device [[of]] from the plurality of storage devices in accordance with said command packet.

25. (Original) The method of claim 24, wherein the first storage processor includes a lookup table that associates one or more virtual logical unit numbers (VLUNs) with one or more physical logical unit numbers (PLUNs), wherein said one or more PLUNs are associated with

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said plurality of storage devices, and wherein said one or more VLUNs are virtualizations of said one or more PLUNs.

26. (Currently amended) The method of claim 24, wherein the routing operations for said data packet over said path further comprises routing said data packet to one of said plurality of host computers.